

CLAIMS

1. A method for production of alkyl esters from a mixture of glycerides and free fatty acids, comprising:
 - a) addition of an acid to an alcoholic solution of the mixture to decrease the pH
 - 5 of the solution to about 1 to 2 to effect acid-catalysed alkyl esterification;
 - b) treatment of the solution from step a) with a concentrated alkoxide solution to raise the pH of the solution to about 12 to effect base-catalysed transesterification of glycerides contained in the mixture;
 - c) treatment of the solution from step b) with acid to decrease the pH of the
 - 10 solution to about 2 to effect acid-catalysed esterification of residual saponified by-products from step b);
 - d) removal of alcohol from the solution from step c) to remove alcohol; and
 - e) separation of resulting alkyl esters.
2. The method according to claim 1, characterised in that alcohol is removed
- 15 from the solution from step c) by distillation.
3. The method according to claim 1, characterised in that alcohol is removed from the solution from step c) by microfiltration.
4. The method according to claim any one of claims 1 to 3, characterised in that the alcoholic solution of the mixture is formed by dissolving or agitating the mixture
- 20 of glycerides and free fatty acids in a similar volume of alcohol to afford about 50% w/w alcohol solution of the mixture.
5. The method according to claim 4, characterised in that the alcohol has a low boiling point.

6. The method according to claim 4 or claim 5, characterised in that the alcohol is selected from a group comprising methanol, ethanol, propanol, and butanol, including *n*-propyl alcohol, *n*-butyl alcohol, isopropyl alcohol, isobutyl alcohol, *sec*-butyl alcohol, *t*-butyl alcohol.
- 5 7. The method according to any one of the preceding claims, characterised in that step a) is performed under reflux conditions.
8. The method according to any one of the preceding claims, characterised in that step b) is performed under reflux conditions.
9. The method according to any one of the preceding claims, wherein the acid is
10 a strong inorganic acid including but not limited to sulphuric acid, hydrochloric acid, phosphoric acid, perchloric acid and mixtures thereof.
10. The method according to any one of the preceding claims, characterised in that the concentrated alkoxide solution comprises sodium and/or potassium hydroxide dissolved in the alcohol used in step a), or sodium or potassium dissolved in the
15 alcohol used in step a).
11. The method according to claim 10, characterised in that the concentrated alkoxide solution comprises about a 10% w/w alkali metal alkoxide solution.
12. The method according to any one of the preceding claims, characterised in that the residual acid remaining in the solution resulting from step d) or the alkyl ester
20 resulting from step e) is neutralised to about pH 6-7 by treating the solution or the alkyl ester with a weak base or by other acid removal means including but not limited to microfiltration or ion exchange.
13. Alkyl esters produced from a mixture of glycerides and free fatty acids obtained by the method of any one of claims 1 to 12.